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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

Kiwi

See Page 89

A SCIENCE SERVICE PUBLICATION

MEDICINE

New Rheumatism Drugs

➤ EXCITEMENT IN the world of arthritics and their doctors centers around four new anti-rheumatism drugs. The four are aldosterone, fluorohydrocortisone, metacortandralone and metacortandracin.

Hundreds of patients have now been helped by some of these new drugs and three of the four show much greater anti-rheumatic effect than cortisone and hydrocortisone.

To the medical men, however, the really exciting, hopeful thing is that chemists can make more powerful antirheumatics than cortisone and hydrocortisone and can even, it now appears, make them without many, if any, side effects, which have been observed when the older chemicals were administered.

When cortisone was first announced, the difficulty of producing this adrenal gland hormone in quantity limited the number who could receive its pain-banishing, joint-easing benefits. As production difficulties were being overcome, doctors were finding other limitations to cortisone for rheumatoid arthritis patients. Moon faces on patients taking the drug for some time were among outward signs of body chemistry changes serious enough to make it necessary to stop the drug or reduce the dose even though arthritis symptoms came back.

Chemists, meanwhile, were working both to produce cortisone synthetically and to produce related drugs that might be even better medicine for rheumatoid arthritis victims.

At the Mayo Clinic, Rochester, Minn., Dr. Philip S. Hench, co-discoverer of cortisone and Nobel Prize winner, and a number of his associates have been trying out two of the new anti-arthritis drugs. These two are aldosterone, also called electrocortin, and fluorohydrocortisone. The first is an adrenal gland hormone. The second is hydrocortisone with the chemical, fluorine, incorporated into it.

Aldosterone proved not to have any anti-rheumatic effect in arthritis, they reported in *Proceedings of Staff Meetings of the Mayo Clinic* (Dec. 22, 1954). This might have been guessed from its chemical make-up, because it lacks what seems to be the very thing that gives antirheumatic power to cortisone and hydrocortisone, that is a hydroxyl group at the C-17 position. If this could be added, aldosterone might become antirheumatic.

Fluorohydrocortisone has the hydroxyl group at C-17 and it has antirheumatic activity. In fact, on a weight basis, it seems to be ten or more times more antirheumatic than cortisone or hydrocortisone, the Mayo Clinic and other scientists have found. Unfortunately, this good feature is offset by its causing much the same undesirable effects on salt, water and potassium in the body that cortisone has.

Metacortandralone and metacortandracin seem to have less of these undesirable effects, although they show three to four times the antirheumatic and anti-inflammatory effect of cortisone and two to three times that of hydrocortisone.

These synthetic chemicals, made by chemists at Schering Corporation, Bloomfield, N. J., were given their initial tests on patients by Dr. Joseph J. Bunim and associates at the National Institutes of Health, Bethesda, Md.

In the last few months, many other doctors have been using these chemicals on a trial basis and perhaps a thousand or more patients have gotten the drugs. So far, results have all been good.

However, in a report to the *Journal of the American Medical Association* (Jan. 22) Dr. Bunim cautions that patients have not been treated long enough to know the true value of the drugs. A year or two or more may be needed for that.

As Dr. Bunim and associates said of the drugs they tried, their synthesis "gives us reason to believe that the search for a more effective therapeutic agent (remedy) is not without promise." Dr. Hench and associates conclude their recent report by saying that the new drugs strengthen "the hope, indeed the conviction, that from the continued development of new synthetic" chemical relatives of cortisone "superior compounds will be made available for the control of rheumatoid arthritis."

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AERONAUTICS

To Test Plane With Magnesium Fuselage

➤ AN EXPERIMENTAL plane with a magnesium fuselage is scheduled for its first flight tests at Mitchell Air Force Base, New York, in February.

The specially designed F-80C is one of two magnesium-hulled aircraft ordered by the Air Research and Development Command. A previous model was successfully static tested at the command's Wright Air Development Center in Dayton, Ohio.

Engineers explain that the advantages in the use of magnesium, a light metal, are that the substance is probably the best substitue for aluminum and that the supply of the metal is nearly inexhaustible.

The thicker skin structure of the aircraft is expected to cut production and maintenance costs. Designers also point out that it is probably the most efficient light structural material where buckling is the controlling design consideration.

When aluminum became scarce in World War II, progressively more magnesium was used in airframes on an experimental basis.

The F-80C tests are scheduled in an effort to determine the complete suitability of magnesium for fighter planes.

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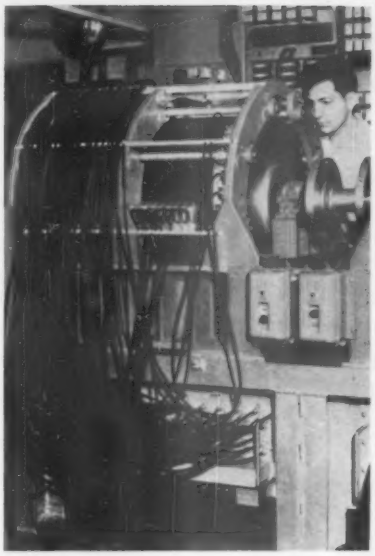

NEW JOB—One of the "memory" units of the Reservisor, an airline device that now can automatically provide late information about take-offs and arrivals, is shown. Each transmission takes a fraction of a second.

ENGINEERING

Electronic Brain Tells When Planes Arrive

➤ THE SAYING that if you are more efficient than you have to be, you will just get more work to do, holds true for electronic "brains" too.

An airline device in New York which has been doling out instant nationwide reservation information was found to have some "brain power" that was lying idle. So engineers have given it a new, extra job.

The Reservisor is the machine's name and it will now also store on its magnetic drum "memory" up-to-the-minute information on arrival and take-off times for American Airlines flights. The conventional system used up until now has been a time-consuming, hand-to-hand operation.

In the new system, facts are sent to the Reservisor about plane schedules with a special keyboard. Each transmission takes a fraction of a second. Late changes can be made after the machine's reserve drum space is loaded with coded information.

When the reservations agent receives a telephone query, for instance on what time flight number 40 will arrive, all he does is press a set of buttons and "ask" the Reservisor. Electronically, the machine searches its magnetic drum and flashes the answer back to the agent. On arrivals, the reply tells whether the flight is on time, and if not when it is expected.

As flight information is fed into the equipment, it is immediately available.

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PHYSICS

World's Best Clock

High frequency microwaves have been obtained for the first time directly from molecules. These waves are used in the most accurate clock ever made.

➤ SCIENTISTS CAN, for the first time, generate microwaves of extremely high frequency by tapping directly the energy of molecules, Dr. Charles H. Townes of Columbia University's physics department reported in New York.

His device for doing so is known as the "maser," short for Microwave Amplification by Stimulated Emission of Radiation. Using a new fundamental principle, it permits amplification of high-frequency radio waves without use of vacuum tubes.

Besides serving as an amplifier, the maser can measure time with greater accuracy than has previously been possible. As an atomic clock, using the ammonia molecule, it produces microwaves with frequencies of 24,000,000,000 cycles per second, with a very small rate change. Other molecules can be used to generate either higher or lower frequencies.

Of Immediate Value

The maser, Dr. Townes said, is an excellent example of fundamental research that has proven to be of immediate practical value in such fields as radio communications, microwave transmission and reception, and navigation. Scientists will find it useful not only for accurately measuring time, but for determining the earth's rate of rotation and examining molecular and atomic structure with greater precision.

Work on the maser began three years ago in the Columbia Radiation Laboratory, which is jointly sponsored by the Army Signal Corps, the Office of Naval Research, the Air Research and Development Command and the University. Government agencies will have royalty-free use of any devices based on the maser, to which the Carbide and Carbon Chemicals Co. also contributed funds for development.

Dr. H. J. Zeiger, now working at Massachusetts Institute of Technology, Dr. J. P. Gordon, now at Bell Telephone Laboratories, and Dr. T. C. Wang of Columbia assisted Dr. Townes in development of the maser.

Not Only Atom Clock

The maser is not the only atomic clock, but it differs from previous atomic timing devices by using the molecular energy directly. Other atomic clocks use conventional oscillators and apply their output to a group of molecules. The molecules do not supply any of their own energy to the signal, as with the maser, but act as a kind of tuned filter. A conventional oscillator is tuned in frequency until its output agrees with that of the molecular filter.

It is primarily because the maser produces microwaves directly from the molecules that it is able to use their very precise resonant frequency with such success.

In the device, a stream of ammonia gas is forced under slight pressure into a sealed chamber from which the air has been removed by vacuum pump. The ammonia molecules are focused by an electrostatic field into two parts, one, molecules of low energy, which usually absorb energy, and the other those of high energy, which can radiate. The low-energy molecules are diverted from the beam, while the high-energy ones are directed into the main part of the device, a small copper cylinder open at one end and known as a "cavity."

Within its walls, some of the ammonia molecules undergo "transitions," giving up tiny amounts of energy in the process, and triggering other molecules to emit their energy, in a kind of molecular chain reaction that builds up a relatively large amount of energy quickly.

If there are sufficient molecules to start a self-sustaining chain reaction, then oscillation occurs inside the cavity and microwaves are emitted from it. If fewer molecules are present, the maser acts like an amplifier. Thus an operator can regulate its action by adjusting the flow of ammonia gas.

The maser can also be adjusted for frequency, using molecules of substance other than ammonia for large changes. Sodium chloride, common table salt, is one compound that will be tried, Dr. Townes said.

MISSING LINK—A primitive crustacean, so small that it can swim through the eye of a needle, is shown in a photograph taken of a microscope image. The tiny animal is believed to be a "missing link" between three of the five major groups of crustaceans now known to exist on earth. The creature was found in Long Island Sound by Howard L. Sanders, Yale graduate student working at the Bingham Oceanographic Laboratory.

Flows Like Liquid

The microwave output from the cavity, which is at most ten-billionths of a watt, flows out through a waveguide and is piped to its destination much like a liquid would be.

Two complete masers have been built so far, a necessity so that one could check the other, since the device is so accurate it cannot be adequately tested any other way.

The oscillation frequencies have been compared to an accuracy of one part in 100,000,000,000, which is probably the most accurate comparison or measurement of any two physical quantities that has yet been made.

Dr. Townes estimated that commercial maser units should sell, once development costs have been written off, for about $500. Masers with highest possible accuracy for scientific use would probably cost over $10,000.

Its First Job

First assignment outside the laboratory for the device is expected to be as a frequency standard, keeping radio and television transmitters precisely on frequency with greater accuracy than present-day vacuum tube oscillators and quartz crystals.

A maser system of navigation could also be developed by tuning in on two different radio stations and comparing that signal with one from the maser, which would tell a navigator the time the radio wave had been traveling to his plane or ship. The time difference can be converted into distance, since radio waves, like light, travel at about 186,000 miles per second.

The maser can also amplify signals too weak for vacuum tube amplifiers. It will probably also be used to check on the rate of the earth's rotation and to discover the exact frequency of oscillation of many kinds of molecules and atoms.

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Because of its nearness to the sun, *Mercury* is the least seen of all the planets visible to the naked eye.

The United States *mineral output* for 1954 is valued at an estimated $13,820,000,000, four percent below the 1953 figure.

METEOROLOGY

Report on Rainmaking

➤ THE WEATHER Bureau made the first public report on its two-year cloud seeding project in Washington State. But Ferguson Hall of the U. S. Weather Bureau in Washington firmly refused to admit either success or failure of the effort to increase rainfall with dry ice until further evaluations had been made.

"Because of our limited ability to estimate the rainfall that would have occurred in the seeded area if dry ice had not been used," he said, "it is possible that seeding effects could have been produced and still have been hidden by natural variations in rainfall."

None of the evaluations made so far, Mr. Hall pointed out, excluded the possibility that effects as great as a 15% increase in precipitation were produced in the target areas under observation, usually about 100 miles long.

There was, he said, apparently a slight negative effect, with seeded areas getting a tiny bit less rain than the control areas.

Chance, the perversity of nature in showering so much rain on control areas that it drowned out any real increase due to seeding in the test areas, could give this effect, Mr. Hall noted.

More definite results may be available by summer, when the information has been analyzed further, including possible increases in rainfall of a highly local nature.

The seeding operations were made during the spring of 1953 and from September, 1953, to May, 1954, over Washington State. Dry ice spread by airplanes was used to insure that the exact location and time of seeding was known. Dry ice is thought to be effective over a wider temperature range than silver iodide, also often used in "rain making."

When suitable cloud formations, usually of the type associated with winter storms, were spotted, an airplane was sent up to make its run. To guard against bias in the test, dry ice was sprinkled only if instructions, contained in a sealed envelope and prepared previously by another government agency, so directed.

Exactly the same measurements were made whether or not the clouds were actually seeded. A total of 60 flights gave 35 with appropriate test conditions. Seeding took place during 22 of these, the other 13 serving as controls.

Rainfall was recorded by 100 gages located in an area about 100 miles in diameter. Two radar sets were used, one to keep a continuous record of clouds over Hoquiam, on the western Washington coast, and the other to spot rain formed during the seeding operations.

"Our survey of clouds, their types and structure, and how many are ripe for seeding, will be one of the most valuable results of this research," Mr. Hall said.

Meteorologists meeting in New York noted that the Advisory Committee on Weather Control announced in Washington that persons attempting to modify the weather now have to submit monthly reports on their operations to the committee for evaluation.

The Weather Control group was set up to recommend to the President and Congress the extent to which the Federal government should experiment with, engage in or regulate attempts to increase precipitation or otherwise affect the weather. It is headed by Capt. Howard T. Orville, retired Naval officer now affiliated with the Friez Instrument Division of Bendix Aviation, Baltimore.

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MEDICINE

Cortisone, Production of Digestive Enzymes Linked

➤ CORTISONE, FAMOUS anti-arthritis drug, and some of its fellow hormones of the adrenal glands are important for the production of food-digesting enzymes in the body, Dr. Burton Baker of the University of Michigan Medical School, Ann Arbor, reported at a conference at the New York Academy of Sciences in New York.

When these hormones are lacking, the cells of the stomach which supply the enzyme, pepsin, shrink and lose their ability to make this digestive chemical. Cortisone also, Dr. Baker said, has the power of restoring the pancreas which makes digestive enzymes for the intestines.

Besides the adrenal hormones, pituitary gland hormones are important in regulating the digestive enzyme producing cells, Dr. Baker finds.

The thyroid gland in the neck also seems to be involved.

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ARCHAEOLOGY

Man's Oldest Settlement Is Unearthed in Iraq

➤ M'LEFAAT, IN northeastern Iraq, is the oldest "town" in the world, the earliest place discovered where early man more than 7,000 years ago turned from nomadic hunting to agriculture. This transition is considered the first great revolution in man's history.

A University of Chicago expedition headed by Dr. Robert J. Braidwood of the Oriental Institute has just discovered this permanent settlement older than Jarmo, also in Iraq, which heretofore has been considered the oldest settled village unearthed by archaeologists, dated at about 5,000 B.C.

The more recently discovered settlement at M'lefaat is a small group of pit houses that the archaeologists believe were covered by tents or sod when they were used so long ago.

The early inhabitants had no pottery, but they had good flint tools, axes, and heavy stone mortars. Absence of sickles in the diggings indicates that they had not yet begun to cultivate grain. Although they made no pottery, there were fragmentary clay figures in the ruins.

M'lefaat is 25 miles east of Mosul in northeastern Iraq near the Iranian border.

The expedition has been in the field since early last fall and has covered 2,400 square miles, testing numerous cave and village sites.

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ARCHITECTURE

Russia's Prefab Plans

➤ THE LATEST in Soviet building is the prefabricated house.

Two marked departures from conventional United States prefabricating practice are noted in the Russian plans. Multi-story buildings, including apartment houses, are prefabricated in the USSR and concrete sections are used. Plans call for a substantial increase in this type of structure.

United States builders do not ordinarily prefabricate apartment houses. In fact, almost all the factory-built homes in this country are one or two story single family dwellings. Also, in this country few concrete parts are prefabricated. Most of the sections are made from wood.

The Voks Bulletin (No. 5, 1954), a publication of the USSR Society for Cultural Relations with Foreign Countries, states that in Kiev in the Ukraine, a six-story house was built in 63 days and in Magnitogorsk, in the Urals, ten workers put up a four-story building with 36 flats in 28 days. United States builders and government experts frankly doubt the feats, but since we do not prefabricate that type of structure, there are no comparable United States statistics. Builders also point out that very little is known about the quality of the resulting structures.

Apparently, the program has been instituted because of the housing shortage in Russia. A joint government and party decree called for a great expansion in the building of prefabricated living quarters. By the end of 1956 the Russian goal is to have about 20% of urban housing factory-built. The extensive use of concrete seems to be designed to save steel.

In the United States at present, about six percent of residential dwellings are prefabricated.

Machinery is slated to play an increasing role in Russian construction. All work on the building site from digging to paint finishing is to be done by machine. While prefabricated parts are being made at the factory, workers will be preparing the site.

Frame prefabrication houses are also planned. A factory is reported under construction that will manufacture 1,000 prefabricated frame houses a year and others are soon to be completed. Some American prefabricating plants far exceed this capacity.

Russian house-building factories are reported to be equipped with automatic concrete mixers, devices for joining fittings and machines for casting and finishing large structure units.

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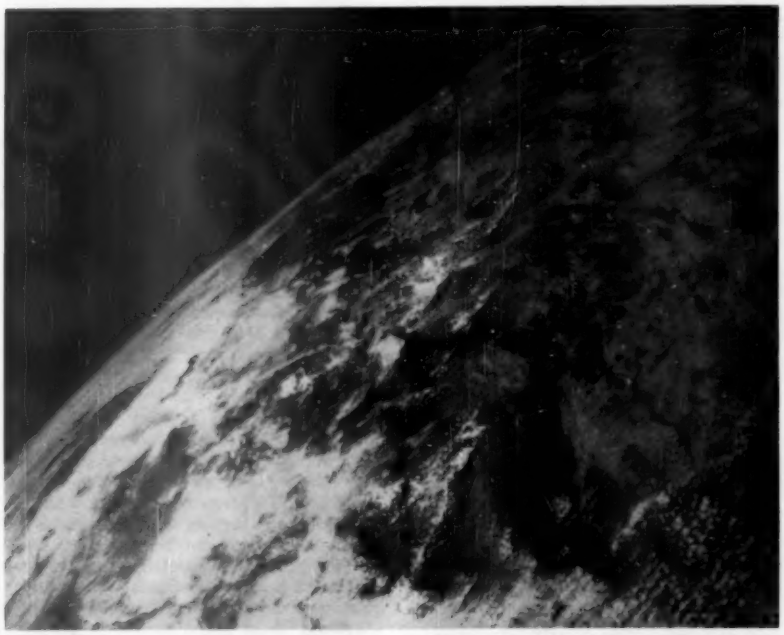

600,000 SQUARE MILES—This picture of the earth showing mainly Texas and Mexico was taken from a Navy Viking 11 rocket when it made its record-breaking climb to 158 miles. Two shots taken with the aerial camera pointing south-southeast were combined. Mexico City is on the horizon, at about the middle of the photograph, while the Gulf of Mexico is on the left covered by clouds. The Pacific Ocean is on the right.

• RADIO

Saturday, February 12, 1955, 5:00-5:15 p.m. EST

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Winners of the Fourteenth Annual Science Talent Search for the Westinghouse Science Scholarships will describe their projects, speaking from various parts of the country.

CHEMISTRY

New Essential Nutrient In Fat May Be Vitamin

➤ A NEW vitamin-like substance, occurring in animal fats such as cream, butter and lanolin, has been found essential to life processes in some types of microorganisms.

The discovery of this hitherto unknown nutrient is reported by Dr. Max Dunn, professor of chemistry, and Merril N. Camien, assistant research chemist, at the University of California at Los Angeles.

The two U.C.L.A. chemists point out that while it has not yet been demonstrated that the substance is essential to higher animals, nutritional requirements generally carry over from lower forms of life to higher species. Some vitamins and other essential nutrients were first discovered in studies with simple organisms.

The new nutrient belongs to a chemical group known as the D-alpha-hydroxy acids, which includes lactic acid, found in milk. Members of this group have analogous but opposite configuration to the commonly occurring L-amino acids, the building blocks of proteins.

D-alpha-hydroxy acids occur naturally in certain animal fats but not in most vegetable fats.

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VETERINARY MEDICINE

Use of Infrared Lamps Can Save Young Pigs

➤ AN AVERAGE of three pigs in every two litters can be saved by using infrared lamps during and after the birth of a new litter.

Infrared lamps provide the necessary heat for the sow and her newborn. Chilling or being crushed by the sow lying on the young pigs costs hog producers an estimated 3,000,000 pigs each year in the United States. And three-fourths of these losses, the U. S. Department of Agriculture reported, occur within two days after farrowing.

Use of the infrared lamps also permits earlier farrowing in that sows can be bred without waiting for seasons, and the lamps are not costly to use. Saving one pig, the Department stated, more than covers the cost of using a lamp for two weeks. Young pigs should be kept under the lamp for three days to two weeks depending on the temperature, the agriculturists added.

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AERONAUTICS

TV Tubes to Replace Instruments in Cockpit

➤ A VERTICAL transparent television tube that may replace part of the front pane of an airplane's windshield has been developed in the Navy's long range plan to simplify cockpit design.

This revolutionary tube along with another flat plate television tube that would lie horizontally in front of the pilot is expected to replace all the scattered dials that are presently built into a plane's instrument panel.

During "blind" flying, the front tube would show an abstracted picture of what the pilot would see if there were no clouds to block his view. The bottom tube would show the geography of the area for navigation and traffic control purposes. Although the vertical screen is to be directly in the pilot's line of vision it will not interfere with his visibility, since he can see right through it, even when the image is projected. The screen is made of two plates of glass with a phosphor screen between.

Special data, such as fuel supply and power readings, could be superimposed instantly on one of the screens by pressing one of the six special levers on the instrument panel.

The Navy's ultimate goal is to replace all the dials, lights and gauges that clutter the instrument panels of modern airplanes with these two TV tubes. The principle of representing flying data in graphic form rather than with isolated dials is based on research in human engineering which has found that pictures are more quickly comprehended than conventional instruments.

The transparent screen was developed by Willys Motors, Inc., Electronics Laboratory in Palo Alto, Calif., and the entire program of simplifying cockpit design is being coordinated by Douglas Aircraft Company in El Segundo, Calif.

The aim of the program is to perfect the installation of these tubes, models of which are already in operation, and to reduce flying controls to two items, a throttle and a control stick. A plane with such equipment is expected to be flight tested in about 1958, a Navy spokesman said.

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METEOROLOGY

Low-Level Jet Streams Linked to Thunderstorms

➤ LOW-LEVEL JET streams, thin fingers of rushing air found about 1,000 feet above the ground, are linked to the formation of night thunderstorms, Dr. Alfred A. Blackadar of Pennsylvania State University told the American Meteorological Society meeting in New York.

The low-level jet is best developed at night, he said, and results from the oscillation of air no longer bound by the friction of daytime mixing.

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TRANSPARENT TV—Hand is seen through a model of a newly developed television screen which will stand vertically in pilot's line of vision. He can see through it, but flying information can also be projected on the phosphor screen.

MEDICINE

Color Test for Polio

➤ RED MEANS polio virus in a new detection test announced by the National Foundation for Infantile Paralysis.

The test is being used now to speed evaluation of the polio vaccine given to thousands of school children in a mass trial last summer. It could also be used to diagnose polio, though the fact that it may take seven days for a final answer in a diagnostic test limits its value for that purpose.

Dr. Jonas E. Salk, whose polio vaccine was used last summer, and his associate Dr. J. S. Youngner at the University of Pittsburgh developed the test under a March of Dimes grant. Here is the official description of how it works:

Use of the test depends on two things, monkey kidney cells and a chemical called phenol red.

Phenol red is a substance which turns yellow when acid is added to it. Monkey kidney cells produce acid when they grow and they are susceptible to the polio virus. It is a combination of these properties that makes the test possible.

In determining the presence of polio virus, phenol red is put in a tube containing monkey kidney cells. Under ordinary circumstances, as the cells grow they give off acid, and this makes the phenol change to yellow in color.

However, if material containing the polio virus is added to the mixture, the virus will kill the kidney cells. When dead, they cannot produce acid. So the fluid in the tube will remain red, a warning that it contains polio virus.

When the test is used to find the level of virus-stopping antibodies in the blood, part of the blood sample and some virus are put in the tube together. If enough antibodies are present, they prevent the polio virus from attacking the kidney cells.

Since there are three types of polio virus, many tubes of test material must be used when levels of antibody are to be precisely calculated. More than a million color tubes will be used throughout the country in the vaccine evaluation.

Before the advent of the color method, scientists were obliged to examine each tube under a microscope. The color method saves a lot of time, since one research worker can see a large number of results at a glance simply by looking at a rack of tubes.

Nevertheless, the monkey kidney cells used in the color test must be incubated for a considerable period, with the result it still may take seven days for a final report on a blood sample. Many hundreds may be run through at the same time in the same seven days but the search for an even more rapid test for polio virus, preferably one taking only a few hours, is continuing under grants from the National Foundation for Infantile Paralysis. Such a test would be of great value for prompt diagnosis of the disease.

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The brightly colored feathers of most male *ducks* are lost in summer molting and give way to a more somber plumage resembling that of the female.

MEDICINE

Blood Carries Polio Virus

➤ BLOOD AND bruises play a part in determining what happens when the polio virus gets into the body. Whether the invading polio virus reaches the brain and spinal cord, how severely it paralyzes and which muscles in the body are paralyzed are all determined apparently by the blood and bruise situation, though other factors, such perhaps as chilling and hypodermic injections, may also play a part.

This new explanation for some of the difference in virulence of polio virus strains was presented to a New York Academy of Sciences polio conference in New York by Dr. David Bodian of Johns Hopkins University, Baltimore.

The polio virus, Dr. Bodian believes, penetrates the brain and spinal cord from the blood rather than by way of regional nerves from the stomach and intestines.

The degree to which the virus invades the brain and spinal cord is related to the ability of the particular virus to make a mass invasion of the bloodstream, developing a high titer in the blood, as scientists say.

Previous injury to muscles apparently causes a reflex change in the blood vessels of the part of the brain or spinal cord controlling those muscles. This makes it easier for the virus, when it gets into the blood, to penetrate that part of the brain or spinal cord and set up infection there. The resulting paralysis is then more likely to come in the muscles under the control of that part of the brain or spinal cord.

The previous injury would not necessarily be a bruise in the ordinary sense. Dr. Bodian made his discovery by hypodermic injection into the calf muscles of monkeys of several non-virus materials. Given before virus was injected into the veins, this increased the rate of paralysis and caused a preferential localizing of the paralysis in the injected legs. This happened whether the injection was given a few minutes or as long as two weeks before the injection of polio virus into the veins.

It may explain an association, reported previously by other scientists, between "shots" given to protect against various diseases, and development of paralysis in child polio patients in the leg or arm where the immunizing injection has been given. Doctors now avoid giving such injections during the polio season.

Dr. Bodian's theory that the polio virus travels to the brain and spinal cord in the blood, instead of along nerves, is based on the following evidence:

Polio virus is often found in the blood of human patients before symptoms develop.

Virus or virus-caused damage cannot be found consistently in nerves leading from the digestive tract to the brain and spinal cord, as would be expected if the virus traveled these nerve pathways. This part of the evidence comes from study of polio paralyzed chimpanzees and of the bodies of human polio victims killed by the disease.

In chimpanzees fed polio virus during the period before the virus got into the blood, Dr. Bodian and associates were only able to find the virus in the intestinal wastes (feces) and in lymph glands associated with the digestive tract.

When the virus is fed to cynomolgus monkeys, its invasion of brain and central nervous system is correlated with its occurrence in the blood stream.

Science News Letter, February 5, 1955

PHYSICS

Subatomic Paths Traced In Bubble Chamber

➤ A NEW tool for catching atomic collisions and studying high-speed particles from giant atom smashers is the bubble chamber devised by Dr. Donald A. Glaser, University of Michigan physicist working on Michigan's Phoenix project.

It is a quart-sized container of clear, super-heated pentane petroleum fraction kept under high pressure to delay its boiling. Subatomic particles plunging through it set up trains of bubbles, just as in the saturated water vapor of the familiar cloud chamber fog trails form.

A bubble chamber six inches long is equivalent to 140-foot cloud chamber.

From photographs of the bubbles, masses and energies of the colliding or created particles can be calculated. In Dr. Glaser's first 22 photographs of particles produced in the two-billion-electron-volt cosmotron at Brookhaven National Laboratory, eight photographs showing pi mesons decaying into mu mesons and then into electrons were obtained.

Science News Letter, February 5, 1955

GENERAL SCIENCE

Honorable Mentions In Science Talent Search

➤ HONORABLE MENTIONS in the Fourteenth Annual Science Talent Search were announced in Washington by Watson Davis, director of SCIENCE SERVICE. Of the 260 outstanding seniors in the list, 55 are girls and 205 are boys. The division was determined by the ratio of girls to boys who participated in the competition.

The 260 young people to whom Honorable Mention listing was given go to school in 170 communities, located in 34 states and the District of Columbia. They were chosen from among 16,033 entrants, 2,575 of whom completed the science aptitude examination, submitted recommendations and scholarship records and wrote reports on "my Scientific Project."

Forty highest-ranking boys and girls already have been notified that they are winners of all-expense-paid trips to Washington. They will spend five days as participants in the Science Talent Institute, to be held in Washington Feb. 24 through Feb. 28. At the closing session of the Institute, $11,000 in Westinghouse Science Scholarships will be distributed.

In the 13 preceding Science Talent Searches, most of the students named in the Honorable Mentions list have been offered scholarships, and many of those named this year will qualify for valuable scholarships and other financial aid in the colleges, universities and technical schools of their choice. The judges found all 300 boys and girls to be students of outstanding ability.

Students in the Honorable Mentions list invariably rank high in their high school graduating classes: 37.5% of the boys and 42% of the girls stood first, second or third in their high school classes.

The Honorable Mentions did not win their places merely by keeping their noses in books. Without exception, they show records of participation in extracurricular activities. Science clubs have attracted 223 of these students. Most of these clubs are affiliated with Science Clubs of America. About one-fourth of the Honorable Mentions have had experience in local, regional, or state science fairs. Six of them have been finalists at the National Science Fair, conducted by Science Clubs of America.

For a booklet containing the names and addresses of the winners and Honorable Mentions and details of the Fourteenth Annual Science Talent Search, send a three-cent stamp with a self-addressed envelope to Science Clubs of America, 1719 N St., N.W., Washington 6, D. C.

Science News Letter, February 5, 1955

TECHNOLOGY

Self-Propelled, Plastic Barge Built for Army

➤ A SELF-PROPELLED plastic barge that can be dismantled and moved by airplane has been developed.

The craft is 51 feet long, and is believed to be the largest reinforced plastic structure ever built. It weighs 10.2 tons, yet settles only 21 inches in the water when carrying a load of five tons. The barge is powered by two 165-horsepower diesel engines, and can push a fleet of non-powered barges carrying cargoes of up to 100 tons.

The hull is constructed of phenolic impregnated cotton duck sandwiched between two sheets of plastic reinforced by glass fiber. It was molded in a large plywood form.

When the masts and searchlights are retracted the barge, built by the Englander Company, Plastics Division, Baltimore, Md., will pass under bridges having a minimum clearance of eight feet.

The barge is designed for the Army Transportation Corps as a light craft to ship supplies to troops over shallow and restricted waterways.

Science News Letter, February 5, 1955

METEOROLOGY

Sudden Weather Changes Are Often Large-Scale

➤ SUDDEN CHANGES in the weather that occur every year about the same date will lead to much more accurate weather forecasts over periods of 30 days or longer, weathermen from the University of Wisconsin predicted at an American Meteorological Society meeting in New York.

The January thaw, which occurs over much of the United States about the third week in the month, is an example of the weather singularities that are now being intensively studied by meteorologists. Although once thought to be highly local in nature, studies of the huge mass of observations made during World War II have led weathermen to conclude that these annual occurrences are really large-scale changes of an entire hemisphere's weather patterns.

Besides the January thaw, which occurs both in northeastern United States and Europe about Jan. 20, the Wisconsin weathermen studied Arizona weather in June and July.

"Arizona experiences a large increase in rainfall within a few days about July 1 in most years," Drs. Reid A. Bryson and William P. Lowry concluded.

This shift of the circulation pattern may be world-wide, they said, but in Arizona its occurrence brings summer rains similar to the "monsoon" of the Far East.

European weather patterns were described to the weathermen by Dr. Bryson, and Drs. Peter M. Kuhn and James F. Lahey, also of the University of Wisconsin.

They analyzed changes in weather type for those dates when the probability of shift was higher than chance occurrence. These "key change dates" were then examined for preferred sequences of the weather patterns.

Some of the key dates they found and the weather type associated with them are: Dec. 7, 9, cyclonic; Dec. 31, Jan. 1-2, cyclonic; Jan. 6, 8, cyclonic, and Feb. 10-11, anticyclonic. Cyclones are regions of low barometric pressure in which the winds circulate in a counter-clockwise direction in the Northern Hemisphere. In an anticyclone, the wind circulation is clockwise and the weather is of a quiet and settled type.

Science News Letter, February 5, 1955

MEDICINE

Changing Birth Rates Change Polio Ages

➤ CHANGES IN the birth rate over the years explain the changes in the ages at which polio attacks, in the opinion of Dr. Carl C. Dauer, National Office of Vital Statistics in the Department of Health, Education and Welfare in Washington.

In Massachusetts, figures for the past 35 years show that the number of children under five attacked by polio declined as compared with the number in the five-to-nine-year age group. The number at this age who got polio increased.

But in 1944 the picture began to change, with more of the "small fry" under five being attacked. At about the same time, there was an increase in polio cases among young adults in the 20-to-24-year age period. Maryland figures showed the same trend.

The increase of polio among the small fry and the young adults came as the number of new babies in the United States was increasing tremendously. Dr. Dauer's theory is that the new babies and the 20-to-24-year-olds both were groups who had not been exposed to polio. The 20-to-24-year-olds, he reasons, would include many new parents who would be likely to get polio from the children.

Science News Letter, February 5, 1955

METEOROLOGY

Science Service Wins Meteorology Award

➤ THREE AWARDS for outstanding service to meteorology were presented by the American Meteorological Society at its 135th national meeting held at New York University recently.

Prof. Charles F. Brooks of Harvard University and Jerome Namias of the U. S. Weather Bureau in Washington received individual honors.

The third award was presented to SCIENCE SERVICE for "its extensive coverage and accurate reporting of current developments in theoretical and applied meteorology." Watson Davis, director of SCIENCE SERVICE, accepted the award.

Prof. Brooks, who organized the weathermen's society in 1919, was honored for his lifetime of service to the Society.

Mr. Namias received his award "for his contribution to, and stimulation of, research in the principles and application of extended and long-range forecasting techniques."

Also honored at the dinner was Prof. Horace R. Byers, chairman of the Department of Meteorology of the University of Chicago, as a past president of the Society.

Science News Letter, February 5, 1955

MEDICINE

New Drug to Help In Child Leukemia

➤ FOR CHILD leukemia victims, there is now a new drug to help prolong their lives and give them more months of health while scientists continue the search for a real cure for the cancer-like blood disease.

The new drug is an anti-folic acid compound very similar to Aminopterin. It is called Methotrexate by its manufacturers, Lederle Laboratories, Pearl River, N. Y. One or two remissions, periods of temporarily restored health, can usually be induced with the new drug, according to the firm's announcement. After that it can be used with cortisone or ACTH to bring another remission.

Science News Letter, February 5, 1955

IN SCIEN

BIOLOGY

Air Mail 36 Rabbits From Missouri to France

➤ THIRTY-SIX more Missouri cottontail rabbits were air mailed to France for further experiments to combat the dread rabbit disease, myxomatosis, which is threatening to wipe out the European rabbit.

The shipment, reported the State of Missouri Conservation Commission, is in response to an urgent request made by the French government. The French Ministry of Agriculture will use the Missouri rabbits for cross-breeding and inoculation studies.

The Missouri Commission is interested in the experiments, not only as a "hands-across-the-sea gesture," a Commission spokesman stated, but because the Missouri bunny might also be susceptible to the dread disease, and advance knowledge would permit more effective preventive action.

Last year the Commission sent 12 rabbits to France in an effort to further the study of means to combat the virus infection which is threatening France's rabbit industry.

Science News Letter, February 5, 1955

TECHNOLOGY

TV Moves to Railroad Yard to Speed Traffic

➤ TELEVISION IS now working on the railroad, all the live-long day and night, to speed routing operations.

In the first permanent installation of its kind in the United States, two television cameras in a shed in the Potomac Yard in Alexandria, Va., keep their ever-vigilant lenses peeled for freight trains arriving from the south. As the train chugs through the shed at 10 miles an hour, the number and initials of each passing car are picked up and relayed to a TV screen in the record office two miles away. Floodlights make it possible for the cameras to operate day and night under all weather conditions. The clerk at the office reads the numbers from the screen into a tape recorder.

From this record, waybills can be processed more rapidly. Cars are then switched onto any one of the 49 northbound classification tracks and made up into new trains.

The new $30,000 system recently unveiled replaces the conventional ground identification process, which yard officials said consumes considerably more time. They also estimate that the system will save the yard approximately 40% net annually over the old method.

Plans for a similar installation for the southbound tracks at the other end of the 520-acre yard are now under consideration.

Science News Letter, February 5, 1955

CE FIELDS

ZOOLOGY

Kiwi in San Diego Only One in Hemisphere

See Front Cover

➤ THE ONLY flightless kiwi in the Western Hemisphere is now in the San Diego Zoo. It and the one in London are the only living specimens outside of New Zealand, its natural habitat.

The strange animal, pictured on the cover of this week's SCIENCE NEWS LETTER, lays an egg almost one-fifth as heavy as itself. The male incubates the egg while the female gathers food and guards the nest.

A rapid runner, the kiwi can inflict serious wounds when cornered by striking out with its long taloned feet. His diet consists of earthworms, grubs, insects, berries and grass seeds. In captivity it eats eight ounces of food daily.

Science News Letter, February 5, 1955

ARCHAEOLOGY

Evidence Muddled That Norse Came Here First

➤ THE PHYSICAL evidence to prove that the Vikings settled on the shores of North America before Columbus is so muddled that Dr. Johannes Brondsted, director of the Danish National Museum in Copenhagen, finds it "highly questionable" that his ancestors got here first.

In the annual report of the Smithsonian Institution in Washington, the Danish expert declares that "the field now is in such a chaotic condition, with conflicting claims, questions of authenticity of relics and charges of fraud, that about the only real hopeful approach now open is a comprehensive expedition of archaeologists with a good Scandinavian background to explore the most likely areas along the Atlantic Coast."

Dr. Bronsted points out that the Icelandic sagas leave no doubt that several Norse expeditions from Greenland landed on the Atlantic coast of North America and could have settled there or wandered away among the Indians. But, at the same time, he explains, the Vikings themselves apparently failed to leave any physical evidence of their visits.

"All efforts to determine the sites of Vinland, Markland, etc., mentioned in the sagas from hints in the texts," Dr. Brondsted reported, "have proved fruitless."

The Danish archaeologist cites three major bits of evidence that are thought to be authentic Norse remainders of bygone excursions to the New World. These are: the "so-called" Beardmore find, a rusted fragment of an iron sword and two other iron objects found near Toronto, Canada; the Newport Tower, the ruin of a small cylindrical stone tower near Newport, R. I.; and the "so-called" Kensington Stone, a slab found near Kensington, Minn., which bears a runic description allegedly telling the fate of a party of Norse explorers expecting to be killed by Indians.

Each of the three has been attacked and defended with no clear-cut and valid conclusions as to their authenticity, the scientist states.

"What is essential," Dr. Brondsted says, "is to find ruins of a genuine Norse settlement or Norse grave on the continent."

Science News Letter, February 5, 1955

HISTORY

Sailing Rig Dates Back to Early A.D.

➤ THE "FORE-AND-AFT" rig that is standard type of sail on all the many small sail boats that dot America's yacht harbors, and on most of those in Europe, has an ancient history, Dr. Lionel Casson of New York University reports.

Great advantage of the "fore-and-aft" rig, with canvas stretched from the bow of the boat toward the stern, is that it is the best kind of sail for travel against the wind, important in yacht races, and for short runs under varied wind conditions.

Antiquity of this type of rigging was discovered when boats carrying it were found portrayed on ancient tombstones dating from the first three centuries of the Christian era. The tombs were in widely separated areas, two in Asia Minor and the third in northern Greece. All show boats with spritsail, ancestral to our modern rigging.

The spritsail was formerly thought an invention of northern European sailors of much later date, Dr. Casson explains in *Archaeology* (Winter, 1954).

Oldest and most important type of sail, Dr. Casson points out, is the square sail. It has been used on all sorts of boats from the day when man first took to the sea. Square sails brought the Greek fleet from Aulis to Troy, carried the Phoenicians the length and breadth of the Mediterranean, and brought Columbus' Santa Maria across the Atlantic. It finished its long career on the famous American clipper ships of the nineteenth century.

The square sail was ideal for long voyages. It offered every inch of its rectangular surface to the thrust of the wind, and caused the vessel carrying it to ride comfortably and safely.

A drawback was that the square sail required a wind that came from behind. To meet the need for a boat to sail against the wind, the fore-and-aft rig was invented. Such a rig was particularly important in the Mediterranean, where every ship that sailed from Egypt or Palestine or Asia Minor to Rome had to slog it out in the face of the wind for most of the voyage, Dr. Casson reports.

Science News Letter, February 5, 1955

METEOROLOGY

Safer Landings From New Weather Measuring

➤ AIRLINE PILOTS flying into Newark airport during bad weather will soon have the use of a new weather measuring system, the first to tell them when they will see vital ground reference points.

Trials of the system for regularly scheduled airlines are expected to start next fall, R. P. Snodgrass of Sperry Gyroscope Company, Great Neck, N. Y., told the Institute of Aeronautical Sciences meeting in New York.

"Visual reference information," needed by pilots to increase safety in instrument landings, is not available under present methods, Mr. Snodgrass said.

The new system tells the pilot when he can first see the ground, the approach lights, the end of the runway and visibility down the runway. This information is "what pilots really want to know," Mr. Snodgrass said, and is of more value than ceiling and visibility measurements at some point remote from the runway.

Raymond C. Wanta, U. S. Weather Bureau meteorologist in charge of the airport station at MacArthur Field, Long Island, N. Y., described the special measuring instruments that will provide this information for the pilots. A rotating beam ceilometer measures cloud heights at frequent intervals and a photoelectric transmissometer determines visibility continuously.

These instruments are planned for installation by the Weather Bureau at more than a dozen airports in the United States.

The new weather measuring system resulted from a two-year study of instrument approach flights under all weather conditions made under the sponsorship of the Air Navigation Development Board and the Weather Bureau in the New York-Long Island area.

Science News Letter, February 5, 1955

NUTRITION

Mashed Potatoes Made From Flakes

➤ TO POTATO chips, French fries and home fries can now be added "potato flakes," a new kind of dehydrated mashed potato.

Described as tasting somewhat like a baked potato, the new product was developed by a team of U. S. Department of Agriculture research scientists, who claimed that the flakes can be rapidly made into mashed potatoes by simply adding either hot water or milk.

An important advantage of the flakes, the scientists pointed out, is that the temperature of the water or milk can vary.

The flakes are made by drying cooked mashed potatoes on the rolls of a steam-heated double-drum drier. Commercial development must await completion of storage tests and cost estimates.

Science News Letter, February 5, 1955

CHEMISTRY

Coal Is Mineral Storehouse

Coal-using industries are wasting valuable by-products. This black earth represents a natural storehouse of many of the earth's rare and minor elements.

By HOWARD SIMONS

➤ COAL-USING INDUSTRIES in the United States are literally throwing away many of the earth's rare and minor elements.

This unintentional waste occurs because coal, in addition to its heating qualities, is also a natural storehouse for several of the world's lesser known, but valuable metals such as cobalt, germanium, molybdenum, lanthanum and yttrium.

The day may soon come when coal is mined for these minerals as well as for fuel.

Scientists in this country and elsewhere have already found and recorded varying amounts of more than 60 elements in coal ash. Finding these elements in coal means that this black, lifeless lump of earth that has warmed man and moved his machines for centuries now offers both science and industry new uses for coal production.

Primarily, it means that the nation has a ready-made reservoir of these metals for use in time of emergency. But perhaps of equal importance, the presence of these elements in coal means, too, that the coal industry itself may some day produce a valuable by-product that can help prop up its economic structure.

New Insights

For scientists, the study of these coal-bearing elements has already provided new and important insights into the relatively young field of geochemistry. And for the mining engineer and geologist, these elements hold a potential means of correlating coal beds and estimating coal reserves, as well as new mineral ore deposits. Agriculture, too, can utilize coal ash containing minor elements.

Under a program started in 1948, scientists of the Geological Survey of the U. S. Department of Interior have been conducting a systematic survey of major coal beds in the United States.

The survey is now almost 75% complete, and it is believed that it will be finished within the next few years.

Although anthracite, bituminous and lignite beds throughout the United States have been studied, the scientists are careful to point out that not all coals contain elements. Nor are all the elements found in every sample. The number of elements and quantity estimates in coal fields vary greatly.

They do emphasize, however, the fact that where the elements are found in concentrated amounts, it would be economically practical to consider these reservoirs as a potential source for mining the metals.

During a global war, many of the major sources of many of the minor metals found in coal may be cut off. When and if this happens, the nation's industry will be forced to rely on domestic sources, or substitutes. The survey now being conducted will help to insure a flow of many of these elements in just such an emergency.

But for the present, these locked-in-coal metals hold a much more timely promise. Inadvertently, industries that use coal for both fuel and non-fuel uses disregard the minor elements which could be recovered.

Scientists are confident that modern technology, if applied, could produce the necessary means for utilizing coal for its fuel value and, at the same time, collect the minor elements.

At present, there is no comparable set-up for this process in the United States.

This, of course, does not mean that every coal-using homeowner should immediately begin to save his ashes somewhere in the basement. Nor does it mean that every lump of coal represents dollars and cents in mineral content.

Because some of the elements are very volatile and a goodly percentage of the element is lost during burning, ordinary furnace methods for getting coal ash containing the metals are impractical.

Only as an illustration that the metals can be derived from coal, three possible methods have been suggested.

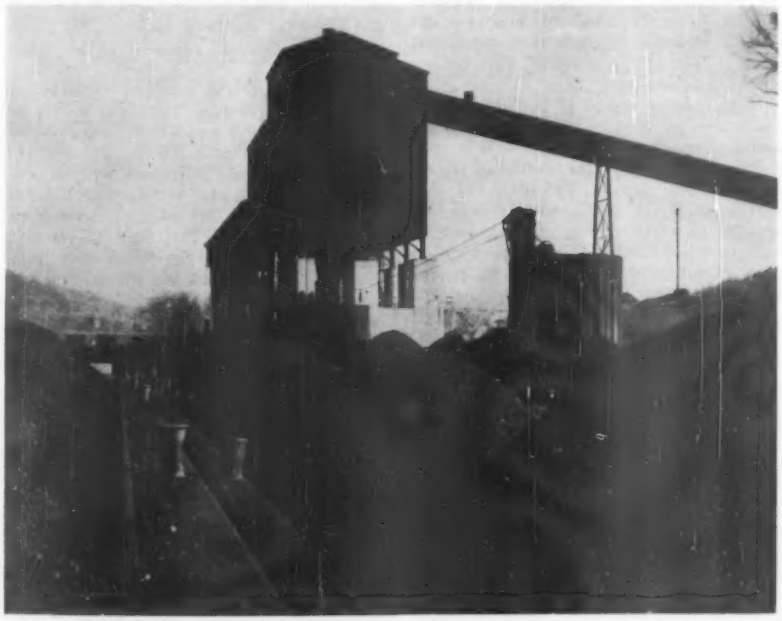
One means would be to collect the elements from the flue dust that goes up the smokestacks. This is analgous to the method by which germanium, the electronics-age metal, is now collected from zinc-smelting operations.

Controlled Burning

Another means would be to ash the coal directly at controlled temperatures as is now being done in the laboratory experiments with coal samples.

Still another way to save the metals would be to re-work the millions of tons of tailings discarded after coal has been used by the chemical industries for non-fuel use, such as in the manufacture of such products as coal tar and dyes.

The study of the elements-bearing coal has already been put to use to help a feared metals shortage. In 1951, the electronics in-



COAL HEAPS—Mounds of coal such as shown here are potentially piled storehouses of many of the earth's rare and minor elements. For coal, the material that man associates with light and heat, is also a natural bank for such elements as germanium, cobalt and boron.

dustry was using germanium in the manufacture of crystal diodes and transistors at such a rapid rate that it was thought that domestic sources would soon be exhausted.

As an illustration of the potential importance of germanium in coal, only one aspect of the minor elements in coal search, the Geological Survey published a progress report, circular 272, outlining the known concentrations of germanium in the coal ash of American coals, as recorded up to that date.

It is only because new sources of germanium, other than that treasured in coal, were found here and abroad that the mining of coal for germanium was arrested. However, coal still remains a very vital and potential source of this metal.

To determine just what elements and how much of them are in a particular coal bed, the government geologists cut samples from the fresh face of a coal bed. After being cut, the sample is marked and sent to the laboratory. There each sample is divided. One half is saved for possible petrographic and chemical study, and the other half is powdered.

The powdered coal is then placed in a cold muffle furnace and subjected to a gradually rising heat, not allowed to exceed 450 degrees centigrade. The ordinary home furnace reaches temperatures of more than 1,000 degrees centigrade.

The pulverized coal is in this way ashed, and the loss of the elements by burning kept to a minimum.

After ashing, the coal is sent to the spectrographic laboratory, where photographic fingerprints of its composition are made on film plates. The laboratory also determines the percentage of each element found in the coal ash.

Ash Content Varies

Coal ashes have been found to vary greatly in their metal content and make-up, even from one seam to the next.

In this manner, the government geologists and spectrographers have identified and recorded 17 minor elements which they believe to exist in sufficient quantity to be economically important.

A spectrographic picture made from a 4.52% ash of a sample taken from an Indiana mine showed, for example, that the ash contained the following elements, given in grams per ton, estimated for the coal field: beryllium, 100; boron, 5,000; titanium, 2,000; vanadium, 90; chromium, 200; cobalt, 200; nickel, 1,100; molybdenum, 30; copper, 800; gallium, 40; germanium, 600; and yttrium, 100.

Spectrographic pictures of the elements, which appear as lines of varying widths on the film plate, can also be used by mining engineers probing for coal seams. Often, a seam will "pinch out," that is will disappear and crop up again somewhere above or below the worked out seam, being separated by bedrock. "Pinching out" had been caused by geologic forces at the time the coal was forming.

Mining engineers may find that spectrographic methods will give them a more perfect tool for correlating these old and new coal seams, as well as coal beds themselves.

The minor elements might also prove valuable in leading prospectors to new or extensions of old ore deposits.

During the Survey's work with germanium in coal ash, it was found that a factor of great significance in explaining the variations of mineral content is the presence or absence of mineralization adjacent to or within coal fields. There are, for example, zinc deposits near the germaniferous coal beds of Stark and Athens Counties in Ohio.

Plants need certain minerals for their systems. Oftentimes, soil in a particular area is deficient in certain of these minor elements. Because coal ashes may contain the elements needed by the soil and the plants, they can be directly applied as fertilizer.

It has been reported that in some areas of the Southwest, coal ashes are already being used for their value as a fertilizer on mineral deficient soils.

Coal is a form of mummified wood that has lain buried for millions of years. Plants then, as they do now, took in trace elements or minerals into their systems.

At first, the plants formed a peat-like swamp and it was during this time that the biochemical processes in the first step of coal formation took place. These biochemical processes were followed by a lignification process. Finally, the heat of friction and pressure exerted for a long time produced the coal as we know it today.

Seek Element Source

Scientists are now trying to determine whether these minor elements were inherent in the plant ash or introduced by sediments brought in from the surrounding land features. Or further, whether the plants were growing over concentrations of the minerals as they do today, and that this might lead to findings of mineralization near or under coal.

Historically, the study of minor elements in coal got off to a comparatively late start. Pioneer work was done during the 1930's by Victor Goldschmidt and C. L. Peters, who first called attention to the unusual concentrations of germanium and other rare metals in some European coals.

The major part of the research work in this country has been carried on largely by the Survey, the U. S. Bureau of Mines, the West Virginia Geological Survey and the Eagle-Picher Company.

It was recently reported that Germany, Japan and England are now operating plants for the recovery of germanium from fly-ash and the residual ash of coal.

Science News Letter, February 5, 1955

ASTRONOMY

Chance Meeting Reveals Unreported Meteorite

➤ AN UNREPORTED meteorite fall more than 18 years ago has been revealed by a chance meeting between a meteoritics expert and an Air Force mess sergeant.

Dr. Frederick C. Leonard, professor of astronomy and meteoritics expert at the University of California at Los Angeles, and Sgt. Laurend M. Mauersberger of Parks Air Force Base, Calif., recently met at the Barringer Meteorite Crater of Arizona.

Upon learning that Dr. Leonard was an authority on meteorites, the sergeant showed him a stony object he had in his pocket. Sgt. Mauersberger said he had found the object on his father's farm near Marlow, Okla., in 1936.

Dr. Leonard immediately identified it as a stony meteorite from a previously unreported fall and secured it for his U.C.L.A. collection.

Science News Letter, February 5, 1955

OPTICAL STAR FINDER

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ICHTHYOLOGY

Reroute Salmon by Smell

➤ FISH, PARTICULARLY salmon, may some day be enticed to return to a designated area by the use of underwater perfume.

A method of directing fish to swim where one wants them to by using artificial odors was patented recently by Dr. Arthur D. Hasler and Warren J. Wisby of the department of fisheries at the University of Wisconsin, Madison, Wis. The decoying operation employs the theory that animals and fish whose migratory habits depend on their sense of smell, can be reared to return to a specific area impregnated with a false scent.

"One method of diverting salmon from their home spawning grounds," the inventors reported, "would be to utilize artificial odors emitted by particular chemicals toward which the salmon are particularly sensitive. A group of salmon fry could be conditioned to such an artificial odor during hatchery rearing. The fish would remember the artificial odor, so that these conditioned fish, several years later, could be reoriented from their natural undesirable spawning grounds by decoying them to another location downstream by introducing the training odor into the desired stream location at the time of the return migration."

The problem of diverting salmon during migration has grown more acute with the increase in water pollution, power dams and the diversion of water for irrigation. Each takes a heavy toll annually of the fish before they can return to their spawning beds.

Scientists have experimented with several methods of enticing the fish to migrate in a specific direction. Experiments with both light and sound have been tried.

In addition to helping the salmon return home safely after swimming around in salt water, Dr. Hasler and Mr. Wisby claimed that decoying fish may prove valuable in getting fish away from a given area where they are interfering with sonar contact between a ship and an underwater target.

The scientists, who received patent No. 2,699,751, and who assigned their rights to the United States of America as represented by the Secretary of the Navy, reported that two exceptionally good chemical training odorants were found to be morpholine and dicyclopentadiene.

Science News Letter, February 5, 1955

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PHYSIOLOGY

Sun to Eyes as Jet Engine Is to Ears

➤ THE LIGHT of the full brilliance of the sun is to the eye as the sound of a jet plane with afterburner is to the ear.

Upon a scale of comparative ratings for varying intensities of sight and sound devised by Prof. S. S. Stevens of Harvard's Psycho-Acoustic Laboratory, they are tops in decibels.

The rumble of a subway is just about as intense as the brightness a person experiences looking straight at a fluorescent lamp. Or at the full moon when it is high in the sky. Both are rated between 95 and 105 decibels.

At 120 decibels, both for sight and sound, there is discomfort. The threshold of normal sight and sound is near the zero point of the decibel scale.

Everything is not decibels, however, since Prof. Stevens found that to persons with normal hearing and vision a low-pitched whisper may seem louder than a high-pitched voice at 50 decibels above threshold. Visually, a red light may appear to grow brighter at a faster rate than does a green light when the intensity is raised above the threshold.

Exposure to the noisy confusion of the subway station and to a strong glare of light may seem to improve hearing and vision in people with some kinds of defects. Some say they can hear better in the subway than when carrying on conversation in a quiet room. Prof. Stevens explained that this does not mean that the threshold for hearing is improved, but rather that voices are raised to overcome the masking effect of the subway noise.

Exposure to loud noises, Prof. Stevens found, may temporarily raise the threshold of hearing by as much as 60 decibels and for a time block off responses to normal conversations. Likewise, extremely strong light temporarily increased the threshold of sight, actually "blinding" a person to lights of lower intensities.

Science News Letter, February 5, 1955

PHYSICS

Atom Smasher Ups Energy Hundred Times

➤ A HUNDRED fold increase in the beam intensity of a high-energy atom smasher and simpler construction and operation is in prospect for a new 20- to 30-billion-electron-volt machine planned by eight midwestern universities.

Prof. Donald W. Kerst of the University of Illinois, inventor of the betatron type of atom smasher, headed the design group that found that pulsed magnets requiring complex control and power equipment can be eliminated, saving much cost. New designs for magnets that can control simultaneously low and high energy particles were worked out with the aid of electronic computations.

The Universities of Illinois, Iowa, Michigan, Minnesota, Wisconsin, Purdue, and Indiana, and Iowa State College hope to build the multi-billion-electron-volt machine with Federal funds. It would deliver five to six times the energy of any now operating. It would be equaled only by a machine planned for Brookhaven National Laboratory on Long Island, N. Y., and one being planned by European nations jointly at Geneva.

The magnet field would be 600 feet in diameter. Cost would be about $25,000,000 and construction time, five to seven years.

Science News Letter, February 5, 1955

Science & Adventure Catalog

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• Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ACTIVE TRANSPORT AND SECRETION—R. Brown and J. F. Danielli, Eds.—*Academic,* Symposia of the Society for Experimental Biology, No. VIII, 516 p., illus., $8.00. Contains the papers read at a symposium of the Society for Experimental Biology held in July 1953.

ADVANCED MANAGEMENT: National Standards in Industrial Administration, Parts I and II—Dickson Reck—*Mellon Institute,* 10 p., illus., paper, free upon request to publisher, 4400 Fifth Ave., Pittsburgh 13, Pa. Clarifying the relationship between industrial companies and national standards.

ADVANCES IN CARBOHYDRATE CHEMISTRY: Vol. 9—Melville L. Wolfrom, R. Stuart Tipson and E. L. Hirst, Eds.—*Academic,* 426 p., illus., $10.50. Contributions from carbohydrate-trained chemists on recent developments in this field.

ANALYSIS OF DEVELOPMENT—Benjamin H. Willier, Paul A. Weiss and Viktor Hamburger, Eds.—*Saunders,* 735 p., illus., $15.00. The purpose of the book, the editors state, is to present a modern synthesis of our knowledge of the principles and mechanisms of development.

CATALYSIS: Volume II, Fundamental Principles (Part 2)—Paul H. Emmett, Ed.—*Reinhold,* 473 p., illus., $12.00. Completing the presentation of fundamental catalytic principles in this series that is attempting to summarize all that is known in regard to the theory and practice of catalysis.

A CHECK LIST OF THE DEGOLYER COLLECTION IN THE HISTORY OF SCIENCE AND TECHNOLOGY—Compiled by Arthur McAnally and Duane H. D. Roller—*University of Oklahoma Press,* 127 p., illus., paper, $3.00. Listing approximately 3,500 entries, representing about 5,000 volumes.

THE CHEMISTRY OF LIVING CELLS—Helen R. Downes—*Harper,* 549 p., illus., $7.50. A basic text in biochemistry, emphasizing the fact that plant and animal metabolism are fundamentally alike.

A DICTIONARY OF PASTORAL PSYCHOLOGY—Vergilius Ferm—*Philosophical Library,* 336 p., $6.00. Definitions of those psychological terms and topics which have pertinence for the minister.

EDUCATING CHILDREN IN GRADES SEVEN AND EIGHT—Gertrude M. Lewis—*Govt. Printing Office,* Bulletin 1954, No. 10, 99 p., illus., paper, 35 cents. Based on a study of seventh and eighth grade classes in 76 schools in 23 states "to find practices which the local people consider to be good for children" in the schools.

INDIVIDUAL DEVELOPMENT—Lawrence K. Frank—*Doubleday,* Doubleday Papers in Psychology, 52 p., paper, 85 cents. The author attempts to establish a frame of reference appropriate for the study of development.

K*: *KREBIOZEN-KEY TO CANCER?—Herbert Bailey—*Hermitage House,* 312 p., $3.50. The subject of this book is also the subject of a current medical controversy. The author supports the Krebiozen side.

A MANUAL OF THE DRAGONFLIES OF NORTH AMERICA (ANISOPTERA): Including the Greater Antilles and the Provinces of the Mexican Border—James G. Needham and Minter J. Westfall, Jr.—*University of California Press,* 615 p., illus., $12.50. Providing an introduction to the insect order called Odonata, or dragonflies.

MATHEMATICS: For Technical and Vocational Schools—Samuel Slade and Louis Margolis—*Wiley,* 4 ed., 574 p., illus., $4.48. A text on practical mathematics as applied to technical and trade work.

THE MICMAC INDIANS OF EASTERN CANADA—Wilson D. Wallis and Ruth Sawtell Wallis—*University of Minnesota Press,* 515 p., illus., $7.50. An anthropological study of an Indian tribe that lives chiefly in the martime provinces of Canada, showing how their culture has changed in the last 300 years.

NATURAL HISTORY OF THE SALAMANDERS OF THE PLETHODONTID GENUS ENSATINA—Robert C. Stebbins—*University of California Press,* 123 p., illus., paper, $1.25. This family of salamanders is notable for its many completely terrestrial representatives.

POYKE—Wolly Carlson, Photography by Hardy Wieting—*All-Pets,* 62 p., illus., paper, $1.00. The amusing antics of a parakeet told in pictures.

RADIO-CONTROL HANDBOOK—Howard G. McEntee—*Gernsback Publications,* Gernsback Library No. 53, 192 p., illus., paper, $2.25. Directed to those who have some knowledge of electronics and model design, this book gives practical methods for uniting these fields.

SYPHILIS: The Invader—Erik Barnouw and E. Gurney Clark—*Public Affairs Committee,* Public Affairs Pamphlet, No. 24A, 28 p., illus., paper, 25 cents. The authors point out that the progress made in the fight against syphilis that followed the discovery of penicillin has brought new problems and dangers.

TRUTH AND FREEDOM—Louis de Raeymacker and others—*Duquesne University Press,* Duquesne Studies, Philosophical Series 5, 133 p., cloth $3.00, paper $2.25. Professors of the University of Louvain consider the freedom of scientific research and expression and its relationship to truth.

THE UNLEASHING OF EVOLUTIONARY THOUGHT—Oscar Riddle—*Vantage Press,* 414 p., $4.50. Scanning the wide range of the evolutionary process and showing the influence of organized religions in the suppression of evoluitonary thought.

Science News Letter, February 5, 1955

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FORESTRY

Columns of Hot Gases Spread Forest Fires

➤ THE SPREAD of forest fires is aided considerably by huge columns of hot gases that rise above the flames.

A preliminary study of the phenomenon by John Vehrencamp of the engineering department of the University of California at Los Angeles has shown that 75% to 80% of the heat from a fire is contained in these convection columns. Thus the heat of radiation, which makes firefighting so difficult, represents only a small portion of the total heat of combustion.

In the swirling gases of the towering columns hot sparks are carried aloft and often spread widely, kindling new fires.

A dramatic illustration of how the columns combine with meteorological factors to spread a fire was observed during the study, a part of the University of California's "Operations Firestop."

A cumulus cloud, which possesses a substantial updraft, passed over the heart of the forest fire last summer near Lake Elsinore, Calif. The combination of the convection column and cloud updraft sucked a huge mass of hot sparks upward in an almost explosive action and scattered it over a wide area. New fires sprang up immediately.

Science News Letter, February 5, 1955

MATH IS FUN

By Joseph Degrazia, Ph.D.

Here is a treasury of brain teasers. You need not be a mathematical genius to solve these problems and puzzles. What you need is to know how to THINK LOGICALLY—how to REASON. This is practically a "course" in applied logic and reasoning—besides being an immense amount of fun that will keep you absorbed for many hours. You will find not only that MATH IS FUN but also that learning math can be fun!

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AERONAUTICS

"Thrust-Spoiler" Makes Jet Landings Safer

➤ JET PLANES can now be braked in the air with a new "thrust-spoiler."

The device is expected to shorten the jet landing approach and provide additional safety. In an emergency, the pilot can turn off the brake and regain full thrust instantly.

The thrust-spoiler, built by General Electric's jet engine department for the J-47, could also be installed on the giant B-47 Stratojet bomber.

Described as lightweight and easy to maintain, the device deflects the gases before they reach the jet exhaust nozzle, thus reducing the effective thrust while the engine runs at full power.

A newer modification of the deflector that would reverse jet thrusts for a more powerful braking action is being developed.

Science News Letter, February 5, 1955

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PALEONTOLOGY

NATURE RAMBLINGS

Dinosaurs

➤ ALL THINGS must have beginnings. Even the mighty dynasty of the dinosaurs, lumbering beasts that ruled the earth for more than three hundred million years, grew from other forms of life, lived their span and disappeared from the world forever.

The bones of the earliest dinosaur so far known date back to the geologic period known as the Triassic Age, roughly 400,000,000 years ago. The first such bones found in this country were dug up in Connecticut over a century ago—first a few fragments, then a complete skeleton with a skull.

Scientists were able to build up a model of what the creature looked like in the flesh. They named it Anchisaurus.

It was not large, as dinosaurs go. An average specimen reached a length of about six feet. Its bones were light, indicating that it could probably move fairly rapidly. Its teeth showed that it lived on a meat diet. It was a hunter, a beast of prey.

There were no men on earth when the dinosaurs swam the seas and strode the hills. Man did not appear until well within the last million years, and there is no really definite evidence of his existence until the last hundred thousand.

The day of the dinosaur ended long before, about 60,000,000 B.C. (Cavemen had enough to face, what with mastodons, cave bears and woolly rhinoceroses; it is just as well that they were spared casual allosauri and diplodocuses.)

The dinosaurs were huge reptiles. They were not lizards, although when early scientists got around to naming the dinosaur branch of the reptile family, they threw together the Greek words "deinos," meaning "terrible," and "sauros," which means lizard.

Even in its earliest form the dinosaur family showed characteristics that justified its name. There was a small head on a long neck, balanced by a long powerful tail at the other end of the body. The forelegs were diminished, but were offset by tremendous power and size in the rear pair, which in some of the later "saurians" became so highly developed that their owners were as much bipeds as are men or kangaroos.

There was the general tendency of the body to settle heavily back upon the pelvis, developing the potbellied figure we have come to think of as the real dinosaur shape. Anchisaurus, first of the dinosaurs, was a true granddaddy of his race.

Science News Letter, February 5, 1955

NUTRITION

Motive Needed to Make Men Try to Lose Weight

➤ NEEDED: A motivating force, social, fashion or otherwise, to make men "strive for slimness" the way women have. If found, this motive might lead to progress against that major health problem, obesity, or, in less polite terms, fatness.

So declared Dr. James M. Hundley of the National Institutes of Health, Public Health Service, Bethesda, Md., at the Weight Control Colloquium at Iowa State College.

If we continue at our present rate, obesity will be even more of a problem in the future, Dr. Hundley predicted. He based this on the increase in total population and the increase in proportion of older people, since obesity is more frequent at older ages.

Among the white population in the United States, there are almost twice as many fat men as fat women. But the picture is reversed among the Negroes, with a very high prevalence of overweight among the women, studies have shown.

Definite health hazards are associated with being overweight. Dr. Hundley quoted studies showing that overweight persons were more likely to have not only one but a combination of serious chronic illnesses, such as heart disease and diabetes, high blood pressure and arthritis, high blood pressure and gall bladder disease, and heart disease and gall bladder disease. While it is difficult to prove that overweight causes these diseases, Dr. Hundley pointed out, doctors have seen improvement in diabetes and in high blood pressure when weight has been reduced.

Methods of controlling obesity are "crude but progress can be made," he said.

Science News Letter, February 5, 1955

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Questions

ARCHAEOLOGY—What is the name of the oldest "town" in the world? p. 84.

□ □ □

MEDICINE—What are the four new rheumatism drugs? p. 82.

□ □ □

METEOROLOGY—About how high up are low-level jet streams? p. 86.

□ □ □

PHYSICS—For what is the name "maser" a contraction? p. 83.

□ □ □

TECHNOLOGY—How is television used in the railroad yard? p. 88.

□ □ □

Photographs: Cover, San Diego Zoo; p. 82, American Airlines; p. 83, C. Albertis; p. 85, U. S. Navy; p. 86, Willys Motors, Inc.; p. 96, John Shrager, Inc.

MEDICINE

Polio Season Brings "Orphan" Viruses

➤ APPEARANCE OF "orphan" viruses during the polio season was reported by Dr. Joseph L. Melnick of Yale University, New Haven, Conn., at a New York Academy of Sciences Conference in New York on polio.

The orphan viruses are not polio viruses and they are not members of the Coxsackie group. But they frequent the intestinal tract during the polio season and produce similar changes in cultures of tissue growing outside the body. They do not, however, react with polio virus anti-serums.

The orphan viruses make up a large assembly. At least six different types exist. Those that have been measured have the same sizes as polio viruses.

Science News Letter, February 5, 1955

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METEOROLOGY

A-Blasts and Weather

➤ A-BOMB EXPLOSIONS do not affect the weather by any test Weather Bureau scientists have been able to make.

Dr. Lester Machta and D. Lee Harris of the U. S. Weather Bureau in Washington investigated possible ways that A-bomb tests might affect weather.

"There appears to be no reason for believing that any past explosion at the Nevada Proving Ground has had any significant effect on the weather more than a few miles from the test site," they concluded.

Every year since the atomic weapons testing program was enlarged in 1951, both the Weather Bureau and the Atomic Energy Commission have been besieged by letters blaming unpleasant weather on the tests. Their analysis in *Science* (Jan. 21) does not support this charge.

Although the two scientists limited their discussion to the atomic explosions because they had not yet examined sufficient data from the most recent Pacific tests, they said their preliminary examination did not indicate "any obvious changes in the weather have been produced by these explosions outside of the test area."

The possible relationships of A-bomb test and weather investigated included effects of atomic debris as cloud-seeding nuclei, on atmospheric electricity, solar radiation, climate and energy level of the atmosphere.

They found no reason "for believing that any of the mechanisms examined" was responsible for weather changes.

Dr. Machta and Mr. Harris concluded that "the year 1953 was an unusual tornado year," but they attributed this to improvements in tornado-reporting methods.

"A study of the temperature and precipitation records for the U. S., does not seem to indicate any departures from normal that are related to the atomic explosions."

Most theories suggested that A-bomb tests would increase rainfall. The U. S. now seems to be going through a dry spell, which began in 1952, the driest year since 1930. The years 1910 and 1921, as well as 1930, were drier than 1952, the meteorologists pointed out, and atomic explosions could not have caused them.

Temperatures in the U. S. have tended to be warmer than normal since 1951, the scientists said, but noted that if atomic debris cut down solar radiation, it should mean lower, not higher temperatures. The trend toward warmer temperatures was even more pronounced during the period 1932 to 1934, long before the atomic bomb.

The cloud-seeding effects of atomic debris were investigated to see if radioactive particles might serve as ice nuclei and by testing the soil thrown into the air to see if it was effective in forming precipitation.

Results in both cases were negative.

Concerning possible electrical effects, Dr. Machta and Mr. Harris concluded that "no observational evidence or theoretical reasons have been found for believing that changes in the electric conductivity of the air will lead to any directly observable changes in the weather other than the possibility of decreasing the amount of lightning."

Although large amounts of dust in the atmosphere are known to reduce solar radiation received on the ground, as occurred after the eruption of Krakatoa volcano in 1883, the amount of dust thrown out by atomic explosions is considerably less than that required to produce a noticeable effect, the Weather Bureau scientists said.

The energy of the explosion itself also has no effect on the weather, the meteorologists concluded, noting that the energy of a "nominal A-bomb" is equivalent to 20,000 tons of TNT, while the energy released by water condensation in a typical thunderstorm is 13 times this amount.

"Further comparisons with natural phenomena reveal similar statistics suggesting that the energy of an A-bomb, while tremendous compared wtih the energy of other man-made explosions, is relatively small compared with that of many natural phenomena," they said.

To make sure that no reasonable explanation concerning the effects of atomic explosions on weather would be overlooked, the Weather Bureau scientists asked for suggestions from most organizations in the U. S. that employ meteorologists.

Of the 80 or so replies received, about half could see no possible connection. The others made suggestions along the lines investigated by Dr. Machta and Mr. Harris.

Although the probability of any change is "small," the two scientists noted that "there does not seem to be any reason why such modification would necessarily produce worse weather than might occur naturally."

Science News Letter, February 5, 1955

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TOOL GAGE measures the depth of the cut of a saw, dado and jointer accurately to 1/64th of an inch. Eliminating the need for rules, squares or test cuts when using table saws, the gage is also useful for measuring round or irregular objects up to 3¼ inches.

Science News Letter, February 5, 1955

SHOWER CURTAIN HOLDER prevents leakage of shower spray or water and keeps curtain from blowing. A suction-cup device that is easily attached or removed, the holder is described as clinging firmly to the shower room wall or bathtub for weeks.

Science News Letter, February 5, 1955

SALT SHAKER is actually a combination salt and pepper shaker made of an unbreakable plastic. The top revolves for easy choice of either the pepper or the salt, but the contents are locked in when the top is closed. Shakers are available in red, blue, green, yellow or white.

Science News Letter, February 5, 1955

TABLE TENNIS game for fast action turns any room in the house into a game room. Game, shown in the photograph, includes paddles, balls and a loop-shaped hoop which can be set up on any kitchen, dining room or bridge table. Object is to get the ball back and forth through the hoop. Other rules are similar to table tennis with a net.

Science News Letter, February 5, 1955

HOT-AND-COLD WATER cooler for the office dispenses hot water at the correct temperature for making instant coffee, as well as cold water. Available in pressure and bottle type models, both hot-and-cold water drinking coolers have a hot water capacity of five quarts, and a recovery rate of from 40 to 60 cups an hour.

Science News Letter, February 5, 1955

SPACE-SAVING CHEST of drawers transforms almost instantaneously into a sideboard and no-leaf extension dining table, seating up to eight persons. The laminated plastic table top provides 63 by 40 inches of dining space and rolls out as easily as a window shade. Designed for small apartments, this expandable dining chest also has three full-depth drawers.

Science News Letter, February 5, 1955

SANDWICH BOXES, molded of plastic, keep food fresh, uncrushed and at the same time eliminate sandwich wrapping. Measuring 4¼ by 4¼ inches and about 1½ inches deep, these lightweight boxes can also be used to keep sliced meats, cheeses and spreads neatly stacked in the refrigerator.

Science News Letter, February 5, 1955

DISPOSABLE ENVELOPES make possible the marketing of high-purity chemicals in small amounts in chemically-resistant packages. Designed to eliminate overstocking and as a space-saving means for small laboratories, the envelopes are triple-laminated with polyethylene, aluminum foil and acetate.

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2-5-5

Do You Know?

Over a third of passenger *automobiles* in the United States are more than 10 years old, and almost two percent have been driven 19 years or more.

Repeated exposure to rapid *air decompression* at high altitudes apparently does not cause long-term damage to aviators' lungs.

The average width of a *tornado* path in the United States is 1,200 feet and the average length of the path is about 16 miles.

One out of every 10 or 15 men living will have *cancer* of the lung by 1970 if nothing is done to reverse the present trend, it was calculated.